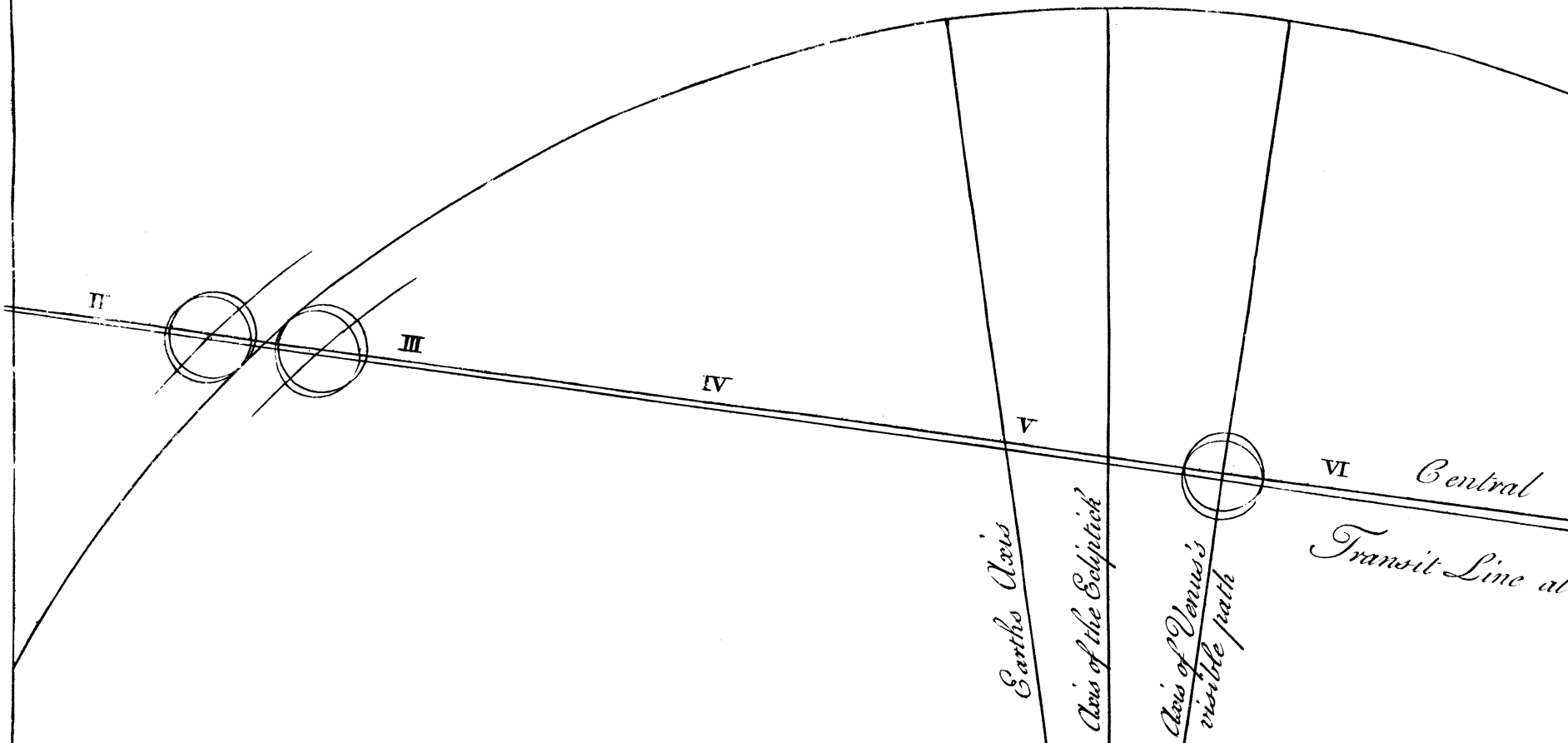
The following Paper by the Revd. Mr. EWING, *was alſo communicated, June* 21, 1768.

GENTLEMEN,

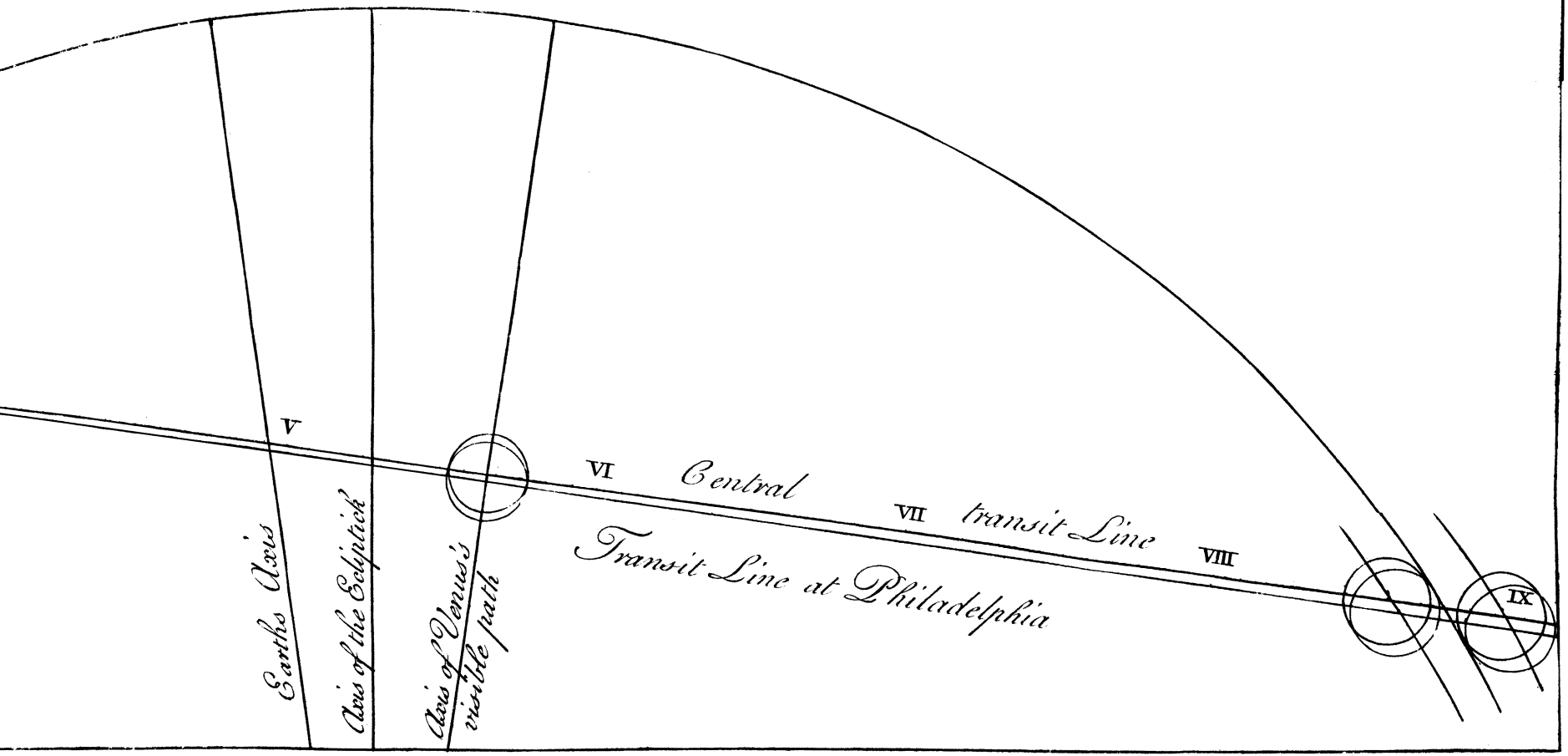
AS you have taken under conſideration, the propoſal which I made to you the 19th of April laſt, of obſerving the enſuing Tranſit of Venus over the Diſk of the Sun, which will be on the 3d of June, 1769; permit me to lay before you a projection of the Tranſit, as ſeen from Philadelphia, together with the elements of the projection, deduced from as accurate a calculation as I could make from Dr. Halley's tables. I find from the obſervations made on the laſt Tranſit in June, 1761, that the mean motion of Venus, for the year 1769, ſhould be 21″ more than theſe tables make it, and that the place of the nodes of Venus, as ſtated in theſe tables, needs the following correction. At the time of the ecliptical conjunction of the Sun and Venus in June 1761, their place was 2ˢ 15° 36′ 33″, and her geocentric latitude was 9′ 44″ .9 ſouth. Then ſay, as 72626 .3 the diſtance of Venus from the Sun : 28894.9 the diſt. of Venus from the earth : : 584″ .9 her geocentric latitude : 3′ 52″ .71 her heliocentric latitude at that time. Then ſay, as the tangent of the inclination of her orbit with the ecliptic, is to rad. ſo is the tangent of her heliocentric latitude to the ſine of her diſt. from the node; *i. e.* as, T, 3° 23′ 20″ : rad. : : T, 3′ 52″ .71 : S, 1° 5′ 14″, which deduct from her place June 6th, 1761, at the time of the tranſit, viz. at 5h. 57′ 20″ at Greenwich; and the remainder viz. 2ˢ 14° 31′ 19″ is the place of her aſcending node at that time. The motion of her nodes, as ſtated by Dr. Halley, is 31″ per annum; therefore, for 8 years, add 4′ 8″ to the abovementioned place of her node, and the ſum, viz. 2ˢ 14° 35′ 27″ is the place of the node in the year 1769, June 3d. With theſe corrected elements, and others, as in the tables, the following calculations are made.

THE apparent time of the ecliptical conjunction of the Sun and Venus, as ſeen from the center of the earth, 1769,

The Transit of Venus over the Sun in the Year 1769 June 3d 5h 4′. 43″ apparent time as reckoned at Philad



769 June 3d 5h 4', 43" apparent time as reckoned at Philadelphia N. S... P. M.



June 3d, $5^h.$ $4'$ $43''$, as reckoned at Philadelphia, $5^h.$ $0'$ $32''$ weſt from Greenwich. The place of the Sun and Venus, at the time of the tranſit, is 2^s $13°$ $26'$ $32''$. The place of her deſcending node is 8^s $14°$ $35'$ $27''$ at that time. The geocentric latitude of Venus at that time is $10'$ $16''.295$. The Sun's ſemidiameter is $15'$ $45''.65$. The ſemidiameter of Venus $0'$ $29''$. Their ſum $16'$ $14''.65$; their difference is $15'16''.65$. Venus's horary motion from the Sun $3'$ $57''.43$. The angle made by the axis of the earth and ecliptic, as ſeen from the Sun, $7°$ $3'$ $16''$. The angle made by the axis of Venus's viſible path and the axis of the ecliptic, is $8°$ $34'$ $17''$; the angular point or node being $1°$ $8'$ $55''$ weſt of the Sun. The angle made by the earth's axis and the axis of Venus's viſible path is equal to the ſum of theſe $15°$ $37'$ $35''$. The horizontal parallax of the ſun on the day of the tranſit is $8''.5204$, when his diſtance from the earth is 101521.2, his parallax at his mean diſtance 100000 being ſuppoſed to be $8''.65$, as found at the laſt tranſit 1761. The horizontal parallax of Venus on the day of the tranſit $29''.9348$, when her diſtance from the Sun is 72626.3, her mean diſtance being according to her periodic time 72333. The difference of theſe, viz. $21''.4144$, is the horizontal parallax of Venus from the Sun on the ſaid day. The Tranſit begins, as ſeen from the earth's center, at $2^h.$ $17'$ $20''.48$, and ends at $8^h.$ $41'$ $46''.72$. The total ingreſs at $2^h.$ $36'$ $31''.38$; the beginning of egreſs at $8^h.$ $22'$ $35''$ 82; ſo that the whole duration between the internal contacts will be $5^h.$ $46'$ $4''.44$. But theſe times will be conſiderably altered by the parallaxes of Venus in longitude and latitude, as obſerved from different parts of the earth. The whole effect of the parallaxes of longitude and latitude at the time of the external contact to haſten it, being $3'$ $31''$, the time of it, as ſeen from Philadelphia, is at $2^h.$ $13'$ $49''$ $28'''$ P. M. And the time of total ingreſs at Philadelphia is $2^h,$ $32'$ $27''$; the total effect of theſe parallaxes to accelerate the internal contact being $4'$ $4''$.

These times depend upon the longitude of Philadelphia Weſt of Greenwich, which in this calculation is ſuppoſed to be $5h.$ $0'$ $32''$, which is as near as I have yet been able to aſcertain it, by comparing a number of obſervations made on the eclipſes of

of the firſt ſatellite of Jupiter, with Mr. Emmerſon's tables. But theſe cannot be depended upon for the longitude, within a minute or two of time, which will by no means anſwer the deſign of aſcertaining the diſtances of the Sun and planets by the enſuing tranſit. I would therefore beg leave to propoſe to the Society, that proviſion be made, without loſs of time, for erecting a ſmall obſervatory in ſome convenient place, that the occultations of ſome known ſtars by the Moon, and the eclipſes of Jupiter's ſatellites, may be noted, and compared with the correſponding obſervations made at Greenwich, and other places: And that ſome proper perſons be appointed to make the obſervations, at the expence of the Society, that our longitude may be aſcertained with the preciſion that is neceſſary. It would be proper, that at leaſt two ſetts of obſervers be appointed to view the tranſit in this city, in order to guard againſt the fatal accident of loſing the Sun out of the field of the teleſcope, in the critical and important moment; which I find happened to a good aſtronomer in the Eaſt-Indies, at the time of the laſt tranſit. It is very difficult to preſerve a celeſtial object in the field of a teleſcope, that magnifies conſiderably.

THE expence of making theſe obſervations, with ſufficient accuracy, muſt be conſiderable; but it is hoped that an opportunity will not be neglected on this account, which, for its importance to the intereſts of aſtronomy and navigation, has juſtly drawn the attention of every civilized nation in the world, and which will not be preſented again for more than a century to come.

THESE things are ſubmitted, with all humility and deference, to the judgment of this reſpectable Society, by

Their very humble Servant,

Philadelphia, June 14, 1768. *JOHN EWING.*

N. B. The difference between ſome of theſe Numbers and thoſe printed in the American Magazine, was occaſioned by neglecting the 21″ of correction in the place of Venus, as inconſiderable; the effect of which is here taken into the computation, and the reſult is ſet down above. See the projection, plate 2.